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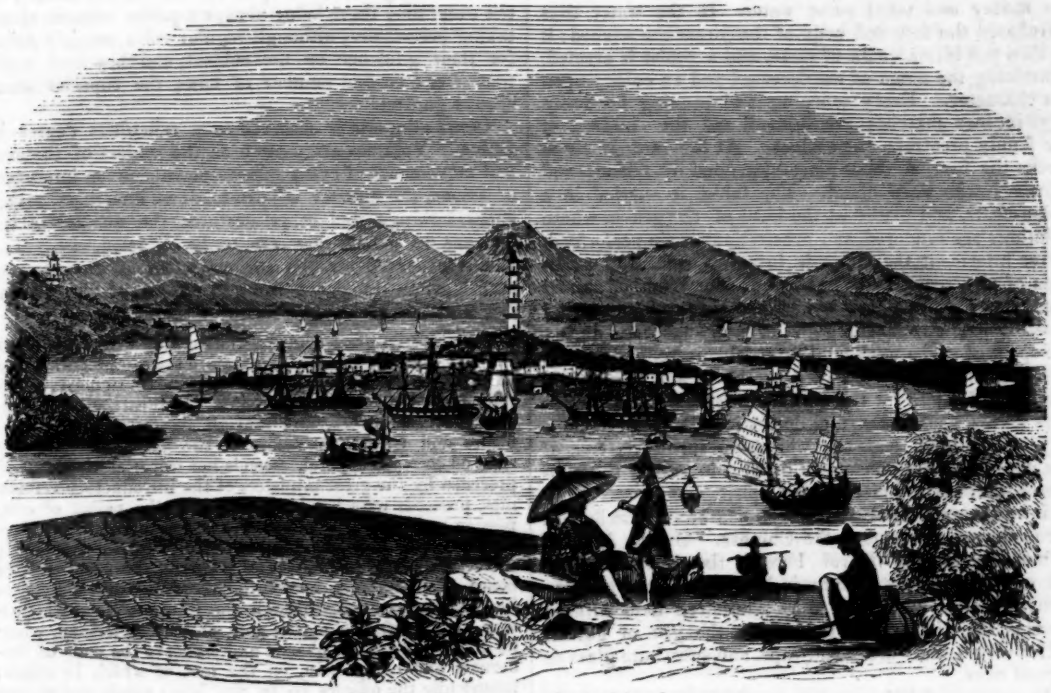
WHAMPOA.



WHAMPOA ISLAND AND THE CANTON RIVER.

About ten miles below the city of Canton, the island of Whampoa divides the river into two channels. This island affords safe anchorage-ground for foreign ships trading to Canton, and on arriving at Whampoa the bustle and variety of the Canton river become very striking. The river seems to be alive with boats, some fishing, some passing up and down or across in all directions. On the shores, as far as the eye can reach, green fields appear in every direction, intersected by small canals, and sheltered by elevated lands which form an agreeable back-ground to the picture. Small villages, each with a dense and bustling population, may be descried through the shady and rich foliage of the banana, the orange tree, and the bamboo. Mat sails are universally employed for Chinese junks of all sizes, and these give a peculiar feature to the scenery about Whampoa, and from thence up to Canton. An eye-witness describes these sails as being composed of a number of mats sewed together, with from six to eight bamboo battans placed at equal distances, and horizontally across the sail; the space between each constituting a reef, which is always taken in on the foot, by lowering the haulyards, and rolling up on the battans, from the extreme end of each of which are lines so placed as to meet at a centre to form the sheet, but yet each supporting its own battan. These junks and boats invariably *tack*, for the act of wearing would, from the jibbing of the sail, endanger their lightly secured masts.

On anchoring at Whampoa, two boats from the offices of the local authorities are placed alongside to prevent smuggling, and their permission is necessary to the landing or shipping of any goods. The exactions on foreign ships have hitherto been very oppressive, and have led to an extensive system of smuggling. In the lading and unlading of ships, a linguist is employed, who transacts all the necessary business connected with fees and duties at the government offices. Five or six of these men are licensed by government, and are considered responsible for all proceedings connected with the cargoes of European vessels.

Conspicuous on the island of Whampoa is its stately pagoda, which rises to an elevation of a hundred and twenty feet. Like most other edifices of the kind it is constructed of brick. The view from its summit is very fine, embracing the varied scenery of the adjacent hills and valleys, and the extensive and animated navigation of the Canton river. Pagodas are also seen erected at certain distances all up the river as far as Canton, and even beyond. Mr. Bennett remarks that in looking from the terrace of the East India Company's late factory, it was observed that these pagodas formed a line of watch-towers; and signals and lights could pass from them with rapidity from one to the other, forming excellent means of telegraphic communication. The pagodas here and elsewhere are, as it is well known, the religious buildings of the Chinese; indeed the name pagoda is a corruption of the Sanscrit word for "holy house." These temples generally consist of a porch or vestibule, an outer sanctuary for the priests, and an inner sanctuary, containing the principal idol. As the fruit of idolatry we may naturally expect to find superstitious observances among the Chinese, when death occurs in their families; and such the report of recent observers proves to be the case.

When the parent of a family dies, a messenger announces the event to relatives and friends, and if the deceased belonged to the wealthier class, a tablet is suspended at the door, inscribed with the name and age. Pieces of white paper are also pasted on each side of the door, white being used as mourning in China. The family, clothed in white, sit weeping around the corpse, which is covered with white cloth or silk. The eldest son puts two small copper coins into an earthen bowl, which he takes in his hands and carries, supported by his friends, to the moat that surrounds the city, or to the well at the gate of the village, where he deposits his money and takes some water. In the water thus purchased the face and body of the corpse are washed; it is then put into a coffin of state, and a tablet is erected, containing the name of the deceased and an eulogy upon his character. Every morning and evening for seven days incense matches are lighted, and the children of the family prostrate themselves. At the end of three weeks the funeral takes place. attended by friends and relatives who weep aloud. The tablet is carried in a sedan-chair, and placed at the head of the grave, where oblations are rendered, and prostrations again performed. After interment the tablet is brought back, and sacrifices of pigs roasted whole, three or four kinds of animal food, fruits, and pastry, are offered with accompanying prostrations, also morning and evening oblations during the space of seven weeks. Rooms, furniture, and domestics, artificially made of paper, are burnt and passed into the invisible state for the use of the deceased. In former ages slaves, attendants, and domestic animals were actually slaughtered, and the wardrobe, furniture, &c., of the deceased were consumed by fire, to supply the supposed wants of the disembodied spirit.

It appears that blue, dull grey, or ash, are also held as mourning colours among the Chinese. On the death of a member of the Royal Family the information is announced by edicts written in blue ink, all the government officers are required to go a hundred days without shaving their heads, and to remove the gilt or golden buttons from their dress and caps, and substitute glass or crystal ones.

In our view of Whampoa, numerous vessels with single sails are to be seen on the river. These are the *sampans*, or vessels usually employed in conveying tea from the foreign factories at Canton, to the ships stationed at Whampoa. When the wind is unfavourable, the sail is lowered, and the boat rowed by ten or twelve men, who impel her onwards at considerable speed by the aid of bamboo poles. These vessels are ill adapted for rough weather, but are managed by the sailors with much courage and dexterity. These men have been trained to the occupation from early childhood, and are by law prevented from living on shore until they have acquired a sum sufficient to purchase a small property, including house and garden.

Leaving the busy scene of commerce which Whampoa and the Canton river present, we shall conclude with a peep at the higher classes of Chinese society, where ceremony and etiquette are diligently studied. The visit of one mandarin to another is thus described by Mr. Scott:—

In front walked two men, with high felt caps, to which were appended two goose-quills, having very much the appearance of a large ink-bottle with two pens in it; they dragged chains after them; then came two more, with the same curious head-dresses, beating gongs; then a soldier, with a red silk chatty, which he carried as if about to charge; after him were two more soldiers, and then the mandarin's sedan made its appearance, carried by four men, and surrounded by soldiers and other attendants; the whole party were shouting, and making a great noise. When they had passed through the great gate, the train filed off to the right and left, and the mandarin walked out of his sedan, and went in, attended only by his pipe-bearer, and one or two more officers. All, with the exception of his immediate attendants, were very raggedly clothed, and the sedan-bearers were almost naked, notwithstanding the inclemency of the weather; indeed, the quantity and not the quality of the attendants seemed the order of the day.

In visiting each other, the Chinese are, as usual, ceremonious. The person calling sends in his card (a piece of red paper, with a few characters upon it) and if the master of the house be at home, and choose to see the visitor, he goes to the door and conducts him to the sitting room, where tea is immediately served up. On the visitor's departure, the master generally accompanies him a certain distance, according to his rank; if a superior, to the gate; if an equal or inferior, not so far; at the same time there being always a polite contest about taking precedence, although regular rules are laid down for their guidance on the subject, and they well know that after a certain number of bows, the superior must always go first.

Court etiquette is observed to a ridiculous degree in China. Volumes are written on the subject of the acts and movements of every official personage on important occasions, the number of prostrations, kneelings, reverences, bowings, and other gestures, the quarter of the heavens to which they are to be directed, &c. The usages observed on the coronation of an Empress are amusing, as translated from the laws of the Tartar dynasty, and given in Professor Kidd's work.

The imperial great empress, the evening before she is enthroned, commands the great officers of state to announce, with all solemnity, in the ancestral temple and contiguous palaces, the precise time of the ceremony. Her carriages of state being in attendance, and musical instruments suspended before and within the doors of the palace, her majesty, arrayed in royal apparel, ascends her imperial chariot, and, preceded by the great ministers of the introductory ceremonies, proceeds with bands of music to the palace of compassion and tranquillity where she reposes for a short time. A temporary throne having been erected for the emperor in the centre of the gateway of this palace, the officers of the board of ceremonies reverentially conduct his majesty to his own apartments, through the glorious imperial gateway, to the left side of the gate of eternal felicity, where he descends from his chariot and walks to the door of tenderness and compassion, on the east of which he stands; meanwhile the officers go to the inner palace and request the empress to ascend her throne. Music is playing during the passage of her majesty from the hall to the presence chamber, which ceases on her ascending the throne. Ministers of state reverentially conduct his majesty to the centre of the prepared throne, where he stands. A special officer arranges the great ministers of state, the body-guard, and court-equipages, in due order when the herald proclaims aloud the words—kneel—worship—rise. Music instantly strikes up on the vermilion steps, his majesty, and all the great ministers of state, kneel thrice and bow nine times; when this ceremony is concluded his majesty is reverentially conducted to his own prepared throne.

After the empress has been attended with music to her palace, his majesty ascends his chariot and returns to his palace. The lady mandarins, conductors of affairs, having erected a throne in front of her majesty's palace of tenderness and repose, and arranged in order the honourable ladies, and ladies-in-waiting, on its right and left, the officers of this board go to the harem and respectfully desire the imperial and noble ladies to proceed to her majesty's palace in their court robes, to perform the ceremony. Eight ladies duly vested with authority—"commissioned married ladies"—reverentially lead the *cortège* through the gate of felicity to the left gate of the palace of excellent melody, where they alight from their chariots, and walk to join the ladies already waiting to receive them. [The ceremonial of ascending the throne is then gone through as before.] Music strikes up on the vermilion steps; the two great ministers of state and the commissioned married ladies respectfully solicit the empress, at the head of the ladies of her apartments, to perform the six reverences, the three kneelings, and the three worshippings. When these ceremonies are ended, they enter the palace of tenderness and tranquillity, where an imperial banquet is conferred, for which the royal guests return thanks by making two reverences and one bow.

VOLTAIC ELECTRICITY.

III.

THE Voltaic pile described in our former article* led to some interesting modifications, such as De Luc's electric column, the dry pile of Zamboni, &c. The former consists of a number of alternations of two metals, with paper interposed, and no apparent liquid element. Thin paper covered with silver leaf punched out into circular discs of about half an inch diameter, is made to alternate with similar discs of thin zinc foil, so arranged that the same order of succession, namely, zinc, silver, paper, zinc, silver, paper, &c., may be maintained throughout. These alternations, amounting to many thousand in number, are most conveniently preserved in a glass tube, perfectly clean and dry within, and surmounted at each end with a brass cap, perforated by a screw, by which the plates may be pressed together, and which also serve as the poles of the arrangement; the screw at one end being in contact with the zinc plate, and that at the other with the silvered paper. Zamboni in his arrangement used discs of paper, gilt or silvered on one side, and covered on the other with a mixture of black oxide of manganese and honey.

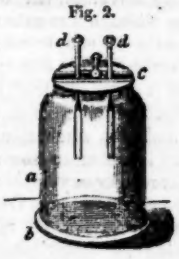
Although this arrangement is called the *dry* pile, the presence of moisture is indispensable to its action. The paper contains within its pores a small portion of moisture, which gradually acts upon the zinc: electricity is thus evolved, which from the great obstacle presented to its recombination through the discs internally, and by the atmospheric air outside, acquires so high a degree of intensity as to act upon the electrometer. If this pile be held by one of its brass caps, and the other cap be made to touch the cap of the gold leaf electrometer, the leaves will diverge, positively from one end, and negatively from the other end of the arrangement; that end of the column to which the zinc surfaces incline being called the *positive*, and that to which the silver discs incline, the *negative* extremity or pole.

If the column be placed with each extremity in connection with an electrometer, as shewn in the cut, one

Fig. 1.

will display positive, and the other negative electricity; and on making a direct communication between the two electrometers by a metallic wire, the divergence ceases, but is again produced soon after such communication is broken.

Fig. 2.



A convenient form of electrometer for experiments with the dry pile is shewn in fig. 2, in which *a* is a glass cylinder mounted upon a wooden base *b*. It is covered with a piece of dry varnished wood *c*, in which the glass tubes *d d* slide backwards and forwards, and through which pass wires having gold leaves suspended to their lower extremities. The distance of the gold leaves may be accurately adjusted by a rack and pinion.

Having adjusted the distance between the gold leaves, if the zinc end of the column be brought in contact with each of the wires to which they are attached, the leaves repel each other; the silver end of the pile produces a similar effect; but if one of the gold leaves be connected with the zinc end, and the other with the silver end of the column, they attract each other; and having thus, by contact, annihilated their opposite electrical states, they separate for a moment, and then again attract and separate as before, a kind of perpetual motion being kept up between the leaves in consequence of the successive electrical charges communicated to them by the column. Upon this principle a variety of scientific toys, under the name of *perpetual motions*, have been constructed: thus a small clapper may be kept constantly vibrating between two bells; or a light pendulum between two conducting surfaces; and these motions continue as long as the column retains its electric activity, which is often for months or years.

If one end of the dry column be connected with the interior, and the other with the exterior of a Leyden jar, the jar will receive a charge; its knob will affect a delicate electrometer, and on discharging it by a wire a very small spark will be observed.

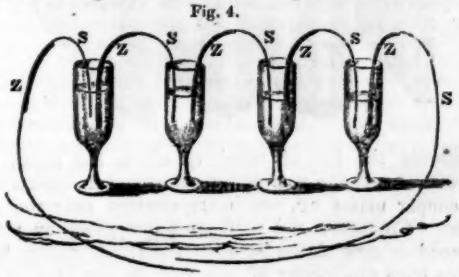
It will be observed, in regard to this instrument, that its electrical excitement is chiefly that of intensity, and that after its discharge a sensible time intervenes before its power is renewed; its electricity is *apparently* independent of chemical action, and has therefore been considered referable only to the contact of the metals. In favour of this opinion it has been urged that whenever any chemical action is apparent in it, its electrical effects cease, as when the zinc or silver become tarnished, or the intervening papers more than ordinarily damp; but it is also rendered inactive by drying the papers so as to deprive them of their hygrometric moisture, and it is said that in the course of years the zinc becomes evidently corroded. It was always presumed that no chemico-electrical effects could be obtained from these piles, but Mr. Gassiot has succeeded in decomposing iodide of potassium by a column of 10,000 series upon Zamboni's construction.—BRANDE'S *Manual of Chemistry*.

The original Voltaic pile must be regarded as one of the most valuable instruments ever invented by man. But its first construction was attended with many inconveniences, especially where the plates were very numerous; the weight of the upper part of the pile pressing the liquid out of the lower part rendered it comparatively inactive. To remedy this, each pair of plates was soldered together, and cemented in regular order in a trough of baked mahogany, as in figure 3, and the intervening cells were filled with the exciting solution. A wire in contact with the last copper plate, and another wire in contact with the last zinc plate, enabled the operator to close the circuit.

Fig. 3

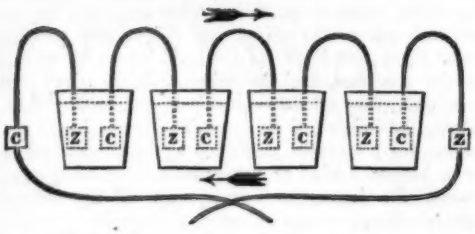
Volta also contrived a modification of the pile, which he called the *couronne des tasses*, or crown of cups. This consists of a number of glasses or cups arranged in a circle or as in the figures, 4, 5, containing dilute acid, and each

Fig. 4.



* See *Saturday Magazine*, Vol. XXI., p. 92.

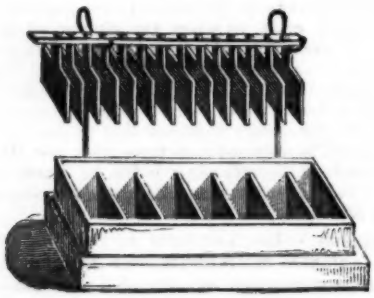
Fig. 5.



glass a wire of silver and one of zinc, so connected that the zinc of the first glass may be in communication with the silver of the second, and the zinc of the second glass with the silver of the third, and so on. In fig. 6, copper is substituted for silver. No action takes place till the extreme wires s and z and c and z are in contact, and then a current of electricity passes in the direction of the arrows, and each silver and copper-wire is seen to evolve hydrogen.

The next improvement was to solder the plates of copper and zinc together in pairs by one point only, and to fix them upon a rod of wood, by which means they could be lifted together in convenient numbers, into or out of a trough of earthenware divided into cells for their reception as in figure 6. The fluid could thus be

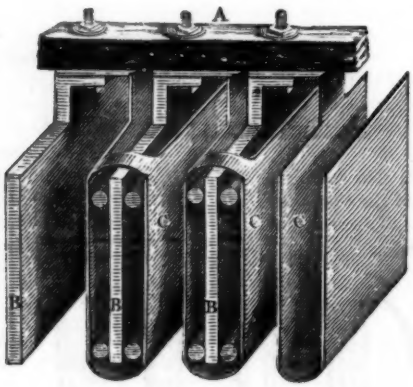
Fig. 6.



allowed to remain in the trough, while the action could at any time be suspended by raising the plates from the cells, and placing them upon the rods fixed for their support.

A considerable improvement was made by Dr. Wollaston, who extended the copper plate so as to oppose it to both surfaces of the zinc, as shown in figure 7. A

Fig. 7.

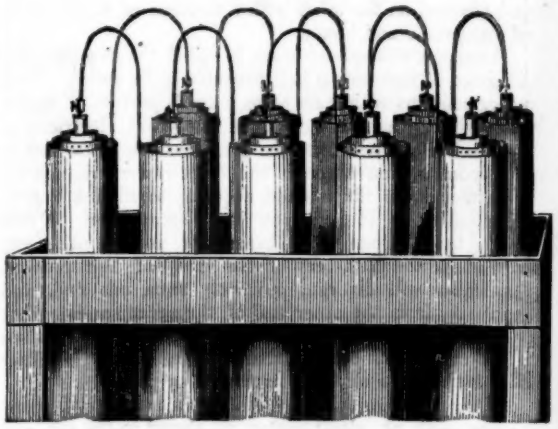


represents the bar of wood to which the plates are screwed, B B B, the zinc plates connected as before with the copper plates C C, which are doubled over the zinc plates. Contact of the surfaces is prevented by pieces of wood or cork placed between them. A copper band passes from the copper of one pair to the zinc of the next pair, so that one of the screws at the top fastens the copper of one pair with the zinc of the next pair, and this order is observed throughout.

The compound circles can be increased to any extent by connecting troughs together in proper order, that is, in the direction of the current. The Royal Institution had a battery composed of two thousand pairs of plates, each plate having thirty-two square inches of surface. With this battery Sir Humphry Davy discovered the compound nature of the fixed alkalies. But the progress of the science proved such extensive arrangements to be unnecessary, for the number of plates being increased beyond a moderate extent did not give a proportionate increase of power.

The compound Voltaic arrangements which are now most advantageously employed are Mr. Daniell's or Mr. Groves. The former consists of a number of the constant cells already described, connected together by wires attached to the copper cylinders, and fastened to the zinc by clamps and screws, as shewn in figure 8.

Fig. 8.



In Mr. Grove s battery, plates of zinc and platina are separated by diaphragms of porous earthenware, the zinc being acted upon by dilute sulphuric acid, mixed with a little nitric acid, and the platina being in contact with tolerably strong nitric acid. The hydrogen evolved by the zinc is completely absorbed by the nitric acid, on which it acts, forming nitrous acid which remains dissolved; and the metals, being those most opposite in their electrical relations, give a most powerful current.

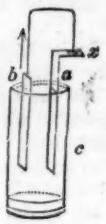
Many of the forms of Voltaic apparatus which we have noticed belong to the history of the science: they are now superseded by the improved arrangements which have resulted from clearer perceptions of the phenomena of Voltaic action, and it is curious to remark that the progress of this science may be accurately traced in the successive mutations to which the Voltaic battery has been subject.

It has been already stated that the development of electricity in metals was attributed by Volta to a peculiar electro-motive force, under which metals, by simple contact, tend to assume opposite electric states. This theory is now discarded, and it is agreed that Voltaic electricity is due entirely to chemical action; that metallic contact is not necessary for its production; and that when electricity is developed by such means, it is owing to some chemical action undergone by the most readily oxydizable metal. The important researches principally of Dr. Faraday, have established the general law that no chemical action occurs unaccompanied by disturbance of electric equilibrium and consequent development of free electricity.

That Voltaic electricity is produced independently of contact, and by chemical action only, may be proved by

the simple and beautiful experiment of Dr. Faraday. A clean plate of zinc *a* was bent to a right angle, and a plate of platinum *b* was fastened to a platinum wire, which was bent as in the figure at *x*; a piece of filtering paper, moistened in a solution of iodide of potassium, was placed on the zinc, and was pressed against the end of the platinum wire. When the plates thus arranged were dipped into the vessel *c*, charged with dilute sulphuric acid, mixed with a little nitric, a current, passing in the direction of the arrow, was established, sufficient to decompose the salt, iodine being thrown down against the platinum wire. The surface of the paper next the zinc was found to be alkaline from free potash.

Fig. 9.



The electricity of the Voltaic pile is therefore derived solely from chemical action. In the lowest pair of plates the zinc is acted on by the fluid, electric equilibrium is destroyed, the negative fluid escapes by the lowest copper plate to the earth, and the positive is retained by the zinc. In the second pair of plates, the negative electricity expelled by the chemical action on the second zinc plate, passes to the first zinc and restores its equilibrium by combining with the positive fluid adhering to it; and these series of actions are repeated to the top of the pile. So that we have thus the remarkable fact which is now established, that however much we increase the number of elements of a galvanic circle, the quantity of electricity passing in the current is equal only to that evolved by a single pair of plates; its tension only being increased with the number of alternations. Thus it appears that the chemical action, and the disturbance of electric equilibrium in the intermediate plates of the pile or battery, are exerted only in urging on the currents to the terminal plates, thus increasing as it were the momentum and consequent tension of the electricity evolved.

CONSOLATION IN SORROW.

While o'er the cold remains of one
Beloved I hung, in its distress
My mind was from distraction won;
A look, replete with tenderness,
A smile had settled on the clay;
'Twas faint, but legible to love!
To me, said more than words could say,—
It shone through death, and from above!—C. H.

Dr. Babington related that, after having been many years from Ireland, an irresistible desire again to see his native soil, made him determine, during a certain vacation, to revisit it, and off he set alone on his expedition. From the route which he had taken, in order to reach his native village, it was necessary for him to cross a river by a ferry. Years before he had passed at this spot a thousand times, and as he sat in the boat, vivid recollections of his youth recurred, filling his mind with mingled sentiments of pleasure and pain. After some minutes' silence, he inquired of the ferryman if he had known the Rev. Mr. Babington, the former rector of the place. "Did I know him, is it you ask—is it Mr. Babington you ask me if I knew? Faith, and I did, for the kindest of men he was to us all." "He was my father," said Dr. Babington. "Was he, by the powers!" instantly exclaimed the fellow; and wrought up at once to a wonderful pitch of enthusiasm, he continued, "Then I'll take you nearer to the falls than ever man showed his nose before." At once, in accordance with his complimentary intention, he set himself vigorously to work, and the boat rapidly neared the dangerous torrent. The consternation of the Doctor, as may readily be expected, was much greater than his gratitude for this act of kindness, and he exclaimed, "I think, my dear man, you cannot show a greater attachment to my father's son, than by just taking me in the very opposite direction." After much demurring, the course of the boat was changed, and the Doctor was landed on the opposite shore.—*Life of Sir Astley Cooper.*

EASY LESSONS ON REASONING.

Lesson XIV.

§ 1. It will often happen that you will have occasion to employ that complex kind of Conditional-syllogism (consisting of two or more such syllogisms *combined*) which is commonly called a "*Dilemma.*"

When you have before you as admitted truths two (or more) Conditional-propositions, with different Antecedents, but each with the same Consequent, and these Antecedents are such that you cannot be sure of the truth of any *one* of them, separately, but are sure that *one* or *other* must be true, you will then, naturally be led to state *both* of the Conditional-propositions, first; and next, to assert *disjunctively* the Antecedents; and thus to infer the common Consequent. As "if every A is B, X is Y; and if some A is not B, X is Y; but either every A is B, or some A is not B; therefore X is Y."

This kind of argument was urged by the opponents of Don Carlos, the pretender to the Spanish Throne; which he claimed as heir-male, against his niece the queen, by virtue of the Salic-law excluding females; which was established (contrary to the ancient Spanish usage) by a former king of Spain, and was repealed by King Ferdinand. They say "if a king of Spain has a right to alter the law of succession, Carlos has no claim; and if no king of Spain has that right, Carlos has no claim; but a king of Spain either has or has not, such right; therefore (on either supposition) Carlos has no claim."

§ 2. When several Conditional-propositions have different Consequents as well as different Antecedents, then we can only *disjunctively* infer those Consequents: that is we can only infer that (supposing some one or other of the Antecedents true) *one or other* of the Consequents must be true. As, "if A is B, X is Y; and if C is D, P is Q; but either A is B, or C is D; therefore either X is Y, or P is Q." Thus, "if the obedience due from Subjects to Rulers extends to religious worship, the ancient Christians are to be censured for refusing to worship the heathen idols; if the obedience, &c., does not so extend, no man ought to suffer civil penalties on account of his religion; but the obedience, &c., either does so extend, or it does not; therefore either the ancient Christians are to be censured, &c., or else no man ought to suffer civil penalties on account of his religion."

So also, "if Man is capable of rising, unassisted, from a savage to a civilized state, some instance may be produced of a race of Savages having thus civilized themselves; and if Man is not capable of this, then, the first rudiments of civilization must have originally come from a super-human instructor; but either Man is thus capable, or not; therefore either some such instance can be produced, or the first rudiments, &c."

§ 3. And when there are several Antecedents each with a different Consequent, then, we may have a Destructive-dilemma: that is, we may, in the Minor-premise *disjunctively deny* the Consequents, and in the Conclusion disjunctively deny the Antecedents. Or again, you may have a Dilemma partly Constructive and partly Destructive; that is, in the Minor-premise (which in a Dilemma is always a disjunctive-proposition) the members—suppose for instance there are two,—may be, one of them, the assertion of the Antecedent of one of the Conditional-propositions, and the other, the contradictory of the Consequent of the other Conditional.

Suppose we say, "if X is not Y, A is not B; and if P is not Q, C is not D; but either A is B, or C is D; therefore either X is Y, or P is Q;" this would be a Destructive-Dilemma; and you may see that it corresponds exactly with the example given a little above, only that we have, here, *converted* both of the Conditional-propositions. (See § 7 of the preceding Lesson.) If we had converted *one* only, and not, the other, of the Conditionals, (as "if A is B, X is Y; and if P is not Q, C

is not D;" &c.,) then the Dilemma would have been *partly* Constructive and partly *Destructive*. For, as has been formerly explained, the difference between a Constructive and a Destructive Syllogism consists merely in the form of expression, and it is very easy to reduce either form into the other.

It may be worth while to observe that it is very common to state the *Minor*-premise of a Dilemma first; in order to shew the more clearly that the several Categorical-propositions which are, each, doubtful, when taken separately, may be combined into a Disjunctive-proposition that admits of no doubt. And this Minor-premise being disjunctive, some have hence been led to suppose that a Dilemma is a kind of *disjunctive* argument; tho' it is really, as we have shown, a *Conditional*.

The name of "*Di*lemma," again, has led some to suppose that it must consist of *two* members only: tho' it is evident that there may be any number.

§ 4. When there is a long Series of arguments, the Conclusion of each being made one of the Premises of the next, till you arrive at your ultimate Conclusion, it is of course a tedious process to exhibit the whole in the form of a series of Syllogisms. This process may in many cases be considerably abridged, without departing from the strict syllogistic-form: [that is, such a form as shews the conclusiveness of the reasoning, from the *expression alone*, independently of the meaning of the Terms, and equally well when arbitrary Symbols are used to stand for the Terms.]

What is called a "Sorites" (from a Greek word signifying a *heap*, or *pile*) is such an abridged form of stating a train of arguments. When you state a series of propositions in which the Predicate of the first is made the Subject (distributed) of the next, and the Predicate of that, again, in like manner the Subject of the next, and so on, to any length, you may then predicate in the Conclusion the *Predicate* of the *last* Premise of the Subject of the first.

Thus "A (either "some" or "every") is B; every B is C; every C is D; every D is E; &c. therefore A is E;" or "no D is E; therefore A is not E." Thus also, "this man is selfish; whoever is selfish is neglectful of the good of others; whoever is neglectful of the good of others is destitute of friends; and whoever is destitute of friends is wretched: therefore this man is wretched."

§ 5. To such a form of argumentation the "Dictum" formerly treated of may be applied, with one small addition, which is self evident. "Whatever is affirmed or denied of a whole Class, may be affirmed or denied of whatever is comprehended in [*any Class that is wholly comprehended in*] that Class." This sentence, omitting the portion enclosed in brackets, you will recognize as the "Dictum" originally laid down: and the words in brackets supply that extension of it which makes it applicable to a "Sorites," of whatever length; since it is manifest that that clause might be enlarged as far as you will, into "a Class that is wholly comprehended in a Class, which again is wholly comprehended in another Class &c."

You will perceive on looking at the above examples that, tho' the first of the propositions of a Sorites may be either Universal or Particular, all the succeeding Premises must be *Universal;* since, else, the "Dictum," as stated just above, would not apply.

You will perceive also that, tho' the last of the Premises may be either Negative or Affirmative, all the preceding ones must be *Affirmative*, in order that the Dictum may be applicable. Thus, in the example first given, it is allowable to say "no D is E; therefore A is not E:" but then it is necessary that "C" should be *comprehended* in "D" (not, *excluded* from it) and "B" likewise in "C," and "A," in "B," since otherwise the "Dictum" would not be applicable.

§ 6. It will be seen, on examining the examples, that there are, in a Sorites, as many Middle-terms as there are *intermediate* propositions between the first and the last; and that it may be stated in just so many separate syllogisms in the 1st Figure; which is the simplest and most common form of a syllogism.

The first of these syllogisms will have for its *Major*-premise the *second* of the propositions in the series, and for its *Minor*-premise, the first of them; and the Conclusion of this first syllogism will be a proposition which is (in the Sorites) not expressed but understood; and which will be the Minor-premise of the next Syllogism. And of this next syllogism the Major-premise will be the *third* that is expressed in the Sorites; and so on.

For instance, (1st,) "every B is C; A is B; [therefore A is C:"] and (2ly) "every C is D;" ["A is C; therefore A is D,"] &c.

The portions enclosed in brackets are those which in the Sorites are *understood*.

The *only Minor*-premise expressed in the Sorites is the first proposition of the Series; all the succeeding minor-premises being understood.

And hence it is that (as has been above said) this first is the only one of all the Premises that may allowably be a *Particular:* because, in the first Figure, tho' the Minor may be either Universal or Particular, the *Major* (as you see from what was formerly said, of the "Dictum,") must always be *Universal;* and *all* the premises in the Sorites except the first, are *Major*-premises.

In this way may also be explained what was above said, that the *last* of the premises of a Sorites is the only one that can allowably be a *Negative:* since if any of the others were negative, the result would be that one of the Syllogisms of the Series would have a negative minor-premise; which, in the first Figure, (as you will see by again referring to the "Dictum") is inadmissible.

§ 7. A Series of *Conditional*-syllogisms (which correspond, as has been shown, to Categorical-syllogisms in the first Figure) may in like manner be abridged into a Sorites; by making the Consequent of the first proposition the Antecedent of the next; and so on: and then drawing the Conclusion by either asserting the *first* Antecedent, and thence (constructively) inferring the last Consequent, or else, denying the *last* of the Consequents, and (destructively) inferring the Contradictory of the first Antecedent. As, "If A is B, C is D; and if C is D, E is F; and if E is F, G is H," &c.: and then, if the Sorites be "Constructive," you add "but A is B; therefore G is H;" or, if "destructive," "but G is not H; therefore A is not B."

The foregoing are all the forms in which Reasoning can be exhibited *Syllogistically;* i. e. so that its validity shall be manifest from the *mere form of expression*.

For, an *Enthymeme* (See Lesson II. § 3) is manifestly not syllogistic; since it is possible to admit the truth of the one premise that is expressed, and yet to deny the Conclusion.

An Enthymeme may indeed be such (since it contains all the three Terms requisite for a Syllogism,) that we can readily perceive what the premise is that *ought* to be understood, and which *if* supplied, would make the Syllogism complete: as "Z is X; therefore Z is Y;" [or "the Elk has horns on the head; therefore it is a ruminant] this *would* be syllogistic, *if* you were to prefix "Every X is Y:" but whether this be the Premise *actually meant* to be understood, we can only judge from the sense of the words that are expressed, and from what we believe respecting the subject-matter in hand, and the design of the Speaker.

In a Syllogistic form on the other hand,—whether Categorical, or Hypothetical, and whether at full length, or abridged into a Sorites—that which is *actually expressed* in the Premises is such that no one *can possibly suppose these true* (whatever be the *meaning of the Terms*, or whether we *understand* them or not) *without admitting the truth of the Conclusion* thence drawn.

§ 8. As for any arguments that are *not* expressed in a regular form, of course no precise rules can be laid down for reducing them into such a form; since any arguments to which such rules do apply, must evidently be, on that very ground, pronounced to be *already* syllogistic. Some general remarks however (drawn chiefly from what has been taught in the foregoing Lessons) may be practically serviceable in the operation of reducing arguments into regular form.

i. It has been remarked (in Lesson III. § 7) that men are very impatient of tedious prolixity in Reasoning; and that the utmost *brevity*,—the most *compressed* statement of argumentation,—that is compatible with clearness, is always aimed at, and is indeed *conducive* to clearness. And hence, (as was pointed out) a single sentence,—or even word—will often be a sufficient *hint* of an entire syllogism.

And it may be added, that such a sentence will sometimes be in the form, not of a *Proposition*, but of an *Exclamation*,—a *Question*,—or a *Command*; and yet will be such as readily to suggest to the mind a Proposition.

For instance, in some of the examples lately given, one might say (in place of one of the Propositions) "Chuse which you will of these two suppositions;" or "Who can doubt that so and so follows?"

The message to Pilate from his wife* furnishes an instance of a single word ("*just*") suggesting a Major-premise, while the Conclusion is stated in the form of an *exhortation:* "have thou nothing to do with that *just* man." And the succeeding sentence must have been designed to convey a hint of Arguments for the proof of each of the Premises on which that Conclusion rested.

§ 9. ii. Remember that (as was formerly shewn) we may change any proposition from Affirmative to Negative, or vice versa, without altering the sense: it being the same thing, for instance, to *affirm* of any one the term "not-happy," or to deny "happy." So that an argument may be valid which might appear at the first glance to have "negative premises."

But if the above experiment be tried in an argument that is *really* faulty on that ground, the only effect will be, to change one fallacy into another: as "A covetous man is not happy; this man is not covetous; therefore he is happy:" here, if you take "happy" as the predicate of the Major, you have negative-premises: if you take "not-happy" [or "unhappy"] as the term, you will have *four terms*.

On the other hand "no one is happy who is not content; no covetous man is content; therefore no covetous man is happy," is a valid syllogism.

That the Conversion-by-negation [contra-position] of a Universal-affirmative, is *illative*, has been formerly explained. And it is very common, and often conducive to clearness, to state such a proposition (A) in the form of this its converse (E); as, for instance, instead of "every motive that could have induced this man to act so and so, must have been purely benevolent," to say "no motive but pure benevolence could have induced him to act so."

iii. Remember that one single sentence (as was formerly explained, Lesson IX. § 7) may imply several distinct propositions, according to the portions of it which you understand as the Subject, and as the Predicate. For instance, "It is the duty of the Judge to decide for him who is in the right; this plaintiff is in the right; therefore it is the Judge's duty to decide for him," might be understood as having *five terms:* but according to the *drift* of the first premise (considered as a part of this argument) what you are speaking of is, not, "the duty of the Judge," but "the person who is in the right;" of whom you assert that "he is fairly entitled to the Judge's decision on his side." And if thus stated, the argument will be seen to be valid.

* Mat. 27, 19.

And here it may be remarked that to state distinctly as Subject and Predicate, that which is *really spoken of*, and that which *is said of* it, will be often the best and most effectual exposure of a Fallacy; which will always be the more likely to escape detection, the more *oblique* and *involved* is the expression.

Notice to Correspondent signed BARBARA, *&c.*

THE suggestion respecting "categorical sentences" shall be attended to.

The subject alluded to in the latter part of the communication could not be fully discussed in a short elementary work. It is in fact no less than the great question between the "*Realists*" and the "*Nominalists*," which at one time was fiercely contested throughout Europe. There are several well-known Works in which the inquirer will find it fully discussed.

NATURAL HISTORY OF CHALK.

I.

THE use of chalk, as an admixture to the clay lands of Essex, has already been noticed in the *Saturday Magazine*, Vol. XVI., page 54; but in the present paper we propose to enter more at length into the history of this familiar substance.

Chalk, when pure, is very nearly white, is opaque, soft to the touch, and light in weight. In some cases, however, it is found sufficiently hard so as to serve as a building material. The beauty of the landscape of which chalk forms the groundwork has frequently excited admiration.

For my own part (says the Rev. Gilbert White) I think there is something peculiarly sweet and amusing in the shapely-figured aspect of chalk hills, in preference to those of stone, which are rugged, broken, and shapeless. Though I have now travelled the Sussex Downs upwards of thirty years, yet I still investigate that chain of majestic mountains with fresh admiration, year by year; and I think I see new beauties every time I traverse it. This range, which runs from Chichester eastward, as far as East Bourn, is about sixty miles in length, and is called the South Downs, properly speaking, only round Lewes. As you pass along, you command a noble view of the wold, or weald, on one hand, and the broad downs and sea on the other. Mr. Ray (the eminent naturalist) used to visit a family just at the foot of these hills, and was so ravished with the prospect from Plympton Plain, near Lewes, that he mentions those capes in his *Wisdom of God in the Works of the Creation* with the utmost satisfaction, and thinks them equal to anything that he had seen in the finest parts of Europe.

Mr. Trimmer, also, in his *Practical Geology and Mineralogy*, observes, that—

Chalk forms an important feature in the geology and scenery of England, from its great extent, from the whiteness of its sea-cliffs, and from the smooth and flowing outlines of its hills, covered with short and verdant turf, destitute in a great measure of wood, and marked by winding and inosculating valleys, which appear to have once constituted a system of drainage, even when they are watered by no stream.

The white chalk is found, with very slight variations of mineral aspect, but subject to interruptions of continuity, over an area above 1100 miles long, extending from the north of Ireland, through England, France, Belgium, Germany, Poland, and Southern Russia, to the Crimea, with a breadth of more than 800 miles, or from the south of Sweden to Bordeaux.

Scotland and Wales are entirely destitute of chalk. A range of these hills, however, extends on the north of the River Humber, from Flamborough Head nearly fifteen miles inland; these are named the Wolds of Yorkshire; the Wolds of Lincolnshire constitute a similar range of hills on the opposite side of the Humber, and have an average breadth of rather more than six miles.

South of the Wash, that great triangular area of chalk

commences, which extends over the eastern and southern counties, bounded on the east and south by the sea, and on the west by a line drawn from Hunstanton Cliffs, in Norfolk, to Abbotsbury, on the coast of Dorsetshire.

Over this area the chalk does not constantly appear upon the surface; being often covered by other strata.

The greatest height which chalk attains in this country is at Inkpen Beacon, in Wiltshire, 1011 feet above the sea; and there are several hills, both in Yorkshire and the southern counties, which attain an elevation of full 800 feet. In the Alps and Pyrenees cretaceous (chalky) rocks have been uplifted to the height of 8000 feet above the sea. In Ireland chalk, harder and more compact than that of England, occupies an area of about 800 square miles in the county of Antrim, covered by basalts, but displayed in the sea-cliffs from the entrance of the Foyle to the neighbourhood of Belfast. The white chalk, continued across the English Channel, appears on the coast of France between Calais and the mouth of the Seine, in cliffs corresponding to those of Dover and Beachy Head, and extends as far southward as the banks of the Loire at Tours.

Further south another cretaceous district appears in France at the mouth of the Garonne, near Rochelle. As an instance of the mixing up, at some early period of the world, of the different strata which form the earth's crust, it may be stated that fragments of the hard kind of chalk peculiar to the county of Antrim, in Ireland, have been found in the south-west extremity of Caernarvonshire.

Chalk is an extensive repository of flint, which occurs in it, either in rounded masses scattered throughout the substance of certain portions of the rock, or, and more frequently, in layers which separate horizontal beds of chalk. These layers consist either of nodules of flint that are rich in organic remains, or simply of a flat pavement of flint from half an inch to two or three inches in thickness, broken up by the weight of the superincumbent chalk. The intermediate beds of chalk are frequently six feet, and more, in thickness; but some less than as many inches. These alternate layers of chalk and flint are to be principally seen towards the upper face of a cliff; at the lower part is a deeper bed of harder chalk comparatively destitute of flints. In Yorkshire and Lincolnshire, and at Hunstanton, in Norfolk, a bed of red chalk, from six to twelve feet thick, forms the base of this lower, harder, and flintless chalk. The whole thickness of the chalk formation varies from 600 to 1000 feet.

Excepting the lines of flint there are no other appearances of stratification in chalk, although from the nature of the petrified remains of animals and plants that are embedded in its substance, there can be no doubt but that *chalk is the hardened deposited mud of an extinct ocean*. Fossil sea-eggs are, perhaps, the most numerous of these remains, and are found preserved both in the chalk and flint. Sometimes they are entirely filled with solid black flint, the white and partly translucent shell, formed of crystallized carbonate of lime, remaining on the exterior. Others, but these are rare, are hollow, with beautiful and regular crystals of carbonate of lime lining the interior of the shell. But the majority are filled with chalk.

Corals and sponges are met with in great numbers, particularly the latter.

Our common white chalk is also full of excessively minute shells and corals. From a pound of the white chalk at Brighton, at least a thousand of these tiny fossils have been obtained. They appear to the eye like particles of chalk, but when examined with a strong magnifying power, are found to be fossils in a beautiful state of preservation. Others, indeed, incalculably more minute, have been observed; for it appears that the white mealy-looking casing of black flints, is formed of the shells of *infusoria*.—MISS ZORNLIN'S *Recreations in Geology*.

Carbonate of lime which, chemically, is the same substance as chalk, exists in the waters of the ocean. It is a function of corals, sea-eggs, and many other similar inhabitants of the deep, to take up this salt of lime from the water in which they exist. Dissolved, and circulating in the fluids of their bodies, the carbonate of lime is then deposited in, and forms the hard matter of, their various shells or skeletons; exactly in the same way as plants absorb carbon from the atmosphere and deposit it from their sap as wood. As whole races of these marine animals died away, it is easy to perceive how their harder and less perishable parts, (the greater number broken up by the motion of the water, and some few preserved entire as memorials of early ages,) would form, at the bottom of the ocean, a bed of carbonate of lime. Add to this, other sources of the same salt from the influx of rivers that contain it, from submarine calcareous springs, and the decompositions that would ensue from the mixing together of these various chemical solutions, and we arrive at the probable origin of the vast beds of chalk, which, subsequently were raised by extensive volcanic agency above the surface of the waters.

The remains of fish that are found in chalk are similar to existing species, which is very far from being the case with many of the organic fossils. Resemblances to the dog-fish, the salmon, and the smelt can be traced in this formation. In the chalk of Sussex, fossil fishes have been discovered with the air-bladder distended, and containing the contents of the intestinal canal, "proving sudden destruction and rapid envelopment."

The skeletons of turtles and of gigantic reptiles were, moreover, deposited in this marine museum. The remains of a reptile, named the Mosasaurus, has been found in the upper chalk of Sussex; its length must have been as much as five and twenty feet, and its organization seems to have been adapted for constant abode in the sea.

No land, or fresh-water shells, nor any bones of mammalia, have been met with in chalk, which is another proof of its marine origin. Fragments of cone-bearing trees occur, indeed, occasionally, but these bear evident signs of having been drifted, probably down the rivers that were emptied into these early oceans. The few entire plants which have been found are all allied to species that grow beneath the waters of existing seas. Iron pyrites, in the form of irregular balls, are the principal metallic body that exists in chalk. We have now noticed the most interesting objects contained in this formation, and in the following number of the Magazine will treat more particularly of its chemical, agricultural, and botanical relations.

THE path of truth is a plain and safe path; that of falsehood, is a perplexing maze. After the first departure from sincerity, it is not in your power to stop. One artifice unavoidably leads on to another; till, as the intricacy of the labyrinth increases, you are left entangled in your own snare.—BLAIR.

VIRTUE, the strength and beauty of the soul,
Is the best gift of heaven: a happiness
That e'en above the smiles and frowns of fate
Exalts great Nature's favourites; a wealth
That ne'er encumbers, nor can be transferred.
Riches are oft by guilt and baseness earned;
Or dealt by chance, to shield a lucky knave,
Or throw a cruel sunshine on a fool.
But for one end, one much neglected use,
Are riches worth your care: for nature's wants
Are few, and without opulence supplied.
This noble end is, to produce the soul;
To show the virtues in their fairest light;
To make humanity the minister
Of bounteous Providence; and teach the breast
That generous luxury the Gods enjoy.

DR. ARMSTRONG.

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